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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/799,248	03/12/2004	Brian Francis Gray	9194	8206

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EXAMINER

DAHIMENE, MAHMOUD

ART UNIT PAPER NUMBER

1765

DATE MAILED: 04/04/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/799,248

Applicant(s)

GRAY ET AL.

Examiner

Mahmoud Dahimene

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 February 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 3/12/04.
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 2 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pozniak (US 4136615) in view of Yang et al. (US 20040077178).

Pozniak discloses a pattern plate of composite structure and describes a method for making the pattern plate. The method comprising:

- a metal sheet (Column 2, line 56)
- conventional photoresist (Column 2, line 62) which is initially uncured before applied to the metal sheet.
- a mask having opaque and light transparent bands (Column 4, line 64)
- a light curing means (Column 2, line 38)
- Providing an acid (Column 5, line 5)
- Providing a caustic (Column 6, line 30)
- The exposed surface of the metal sheet is coated in a conventional manner with poly(vinyl cinnamate) photoresist (Column 6, line 8)
- The metal sheet is exposed to light through a negative having opaque non-image areas (Column 6, line 12) which reads on disposing a mask between the layer of photoresist and the light curing means, and exposing the

photoresist through the mask means to cure the portions in register with transparent regions.

- And the metal sheet is etched with an acid (Column 6, line 14), a caustic is used. As to the step of rinsing or washing away the acid from the etch step, Pozniak discloses a caustic is used to neutralize pH.

A difference is noted between applicants claim 1 and the reference of Pozniak, Pozniak does not disclose a step where photoresist polymer is further applied to the upper surface and side wall of the at least one protrusion.

Yang et al. disclose a method for laterally etching a semiconductor structure where a mask (222) is applied to an electrode for subsequent etch step. The polymeric mask (222) protects the upper portion of the side walls (220) and the upper surface (214) of the electrode (206) (page 3, paragraph 37) and (figure 2B). It is noted that in this particular case the gate structure (which is a protrusion) is not a metal but a conductor, and the polymeric film is not a photoresist polymer. The intension, in Yang's reference, is to etch an undercut or notch under the gate structure, however, the disclosed method clearly provides a method for mask protecting the upper surface and side walls of a structure for allowing an additional etch step to further etch the structure with control of the side walls profile (in this case undercut).

Therefor it would have been obvious to one of ordinary skill in the art at the time the invention was made to add a step to the method of the reference of Pozniak, as described above, this step, as taught by Yang consists of applying a polymer mask to cover the upper surface and side walls of the at least one protrusion to further etch

higher aspect ratio of the protrusion with control of the profile, because, with proper etch control, the method of Yang allows to etch high aspect ratio protrusion if needed, the applied mask covers the already etched top of the structure for further etching to increase the aspect ratio, the subsequent etch profile could be undercut, tapered or straight depending on the etch time and conditions. Using a photoresist mask instead of the cited polymeric mask would have been an obvious modification because photoresist is a masking material conventionally used in semiconductor manufacturing processes such as the one disclosed by Pozniak.

One of ordinary skill in the art would have been motivated to add the step taught by Yang to etch high aspect ratio structures because this method potentially allows etch of high aspect ratio structures without the need for highly anisotropic etching means.

As to the step of rinsing or washing away the acid from the etch step, Pozniak discloses a caustic is used to neutralize pH. It would have been obvious to one of ordinary skill in the art to use a caustic to neutralize the acidic residue from the metal plate, because, after the etch step, the etch process needs to be effectively stopped, rinsing with an acid neutralizer is not uncommon in the art of wet etching.

As to claim 2, if a 2 step etch process is used to obtain a higher aspect ratio structure or protrusion (with the desired profile) than a one step etch process, it would have been obvious to one of ordinary skill in the art to repeat the process three or more times to obtain a yet higher aspect ratio of at least about 1.

With respect to claim 5, the limitation of the suitability of the forming structure of claim 1 for use in an apparatus for making formed polymeric film is considered to be an

intended use limitation which does not distinguish the final structure which is produced by the combination of references of Pozniak and Yang, since the final structure produced by the combination of references of Pozniak and Yang is the same as that defined in applicants claims, the final structure would have the capability for use in an apparatus for making polymeric film.

3. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Pozniak (US 4136615) in view of Yang et al. (US 20040077178) as applied to claims 1 and 2 above, and further in view of Luthje et al. (US 20010021419).

The modified method of Pozniak, as described above does not include a printing apparatus for applying photoresist on the protrusions. Luthje discloses a method for applying photoresist to a base body surface, the method makes use of a pointed source device in the form of a pulse printing device to apply photoresist on a surface (page 6, paragraph 74). The apparatus allows different profiles of photoresist (51) to be applied to a surface (42) (figures 4 and 5).

Therefore it would be obvious to one of ordinary skill in the art at the time the invention was made to use the printing apparatus of Luthje to apply photoresist on the upper surface and side wall of at least one protrusion, because the printing apparatus of Luthje would conceivably allow deposition of photoresist with specific profiles, shapes and precise locations such as protrusions. One of ordinary skill in the art would have been motivated to use the printing apparatus of Luthje for this task because conventional methods such as uniform coating are not suited for this three dimensional

application, a more selective deposition method, that allows a choice of profiles and shapes of selectively deposited photoresist, is therefor needed.

4. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Pozniak (US 4136615) in view of Yang et al. (US 20040077178) and Luthje et al. (US 20010021419) as applied to claim 3 above, and further in view of Ichinose et al. (US 5688366)

The modified method of Pozniak, as described above, fails to include flexographic printing as the printing apparatus.

Ichinose discloses an etching method for producing a semiconductor device where flexographic printing is suggested as a means to coat a surface with photoresist (column 1, line 66).

Therefor it would have been obvious to one of ordinary skill at the time the invention was made to use flexographic printing because the method allows the possibility of selectively applying photoresist on the top and side walls of structure with precision where conventional uniform coating cannot be utilized.

5. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Pozniak (US 4136615) in view of Yang et al. (US 20040077178) as applied to claims 1 and 2 above, and further in view of Saksa et al. (US 20030185971).

The modified method of Pozniak does not include a photoresist mask achieved via a printing process.

Saksa discloses a method for ink jet printing circuit wherein the conductive structures of the printed circuit board may be applied by using, for example, screen-printing or photographic methods, e.g., applying photoresist exposing, and developing (page 1, paragraph 3). It is noted that Saksa does not discuss the particular structure claimed by the applicant, however, Saksa discloses applying photoresist via a printing process.

Therefor, it would have been obvious use a printing process to dispense the photoresist mask in the modified method of Posniak because applying a continuous uniform layer of photoresist on top of a mesh structure, similar to the one shown on applicants figure 1, is more difficult to achieve than on a flat surface. Photoresist thickness uniformity is harder to near the corners of the upper surface of the mesh structure because the fluid will tend to accumulate or overflow depending on the coefficient of viscosity. One of ordinary skill in the art would have been motivated to use a printing process because the printing screen could be aligned with the mesh structure to selectively deposit photoresist a distance from the top corners to insure photoresist thickness uniformity.

Response to Arguments/Remarks

1. Applicant's arguments/remarks filed on 02/21/2006 have been fully considered but they are not persuasive.

In reference to all applicant's remarks in pages 2 to 7, with respect to the argument that there is no suggestion to combine the references, the examiner

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recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, the motivation to modify Pozniak by the teachings of Yang is found in the knowledge generally available to one of ordinary skill in the art.

As to the applicant's remark (page 2) related to the fact that Pozniak teaches "thorough removal" of the metal right down to the "all plastic structure", the literal citation of Pozniak's teachings (column 5, lines 9-14) is "In general, narrow or small areas becomes etched to a relatively more **shallow depth** as represented by 44a while relatively wider areas become etched more deeply as shown at 44b and 44c. Larger areas may become etched completely through the metal sheet 11 as shown at 44c" (see also figure 2B). Clearly Pozniak does not teach removing all metal in all open areas, thorough removal is obtained in large open areas only.

Pozniak also suggests the non-printing areas should be cleaned citing "Surprisingly, during the acid etching step of preparing the pattern plate, the etchant thoroughly removes the metal in the **larger areas** of maximum depth of etch. This result substantially eliminates the need to mechanically rout out and clean up these non-image (non-printing) areas of the etched plate to remove superfluous metal not cleanly removed by etching, a practice usually performed and requiring specially skilled

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workers. In the present plates, etching cleanly removes the metal in such areas, and little or no subsequent hand work is necessary" (column 5, lines 40-50). Pozniak suggest "little hand work" might be needed after the etch step. For obtaining higher printing resolution (printing of finer details), one of ordinary skill in the art would have found it obvious to remove more of the metallic material in narrow areas (44b) or even (44c) not completely removed by the method of Pozniak.

The method of Yang provides a way for cleaning or removing material from the smallest/narrowest areas (44a) down to the submicron scale (if desired), this benefit is a motivation for modifying the method of Pozniak with the teachings of Yang, as expressed in the first office action by " further etching higher aspect ratio" (page 4). This second step etch is more efficient and economically desirable than the "hand work" of Pozniak.

As to applicant's remark (page 3) regarding Yang method disclosing "lateral etching", one of ordinary skill in the art would know that the method of Yang provides an isotropic etch which when properly controlled can achieve lateral etching. The controlling parameter in the present case is simply etching time as suggested by Yang "performing a lateral plasma etch process that laterally etches a wall at the bottom of the structure until the structure is notched to a predetermined width" (page 1, paragraph 0008). The isotropic etch removes material both laterally and from the bottom surface as well at the same removal rate. If no substantial lateral etch is desired, one would have to stop the etch before substantial notching or undercutting occurs.

All other remarks made by the applicant are based on the lack of motivation for combining references, which was addressed above.

As to applicant's remark (page 4) regarding claim 3, a motivation for combining references was provided (in page 5 of the office action).

As to applicant's remark (page 5) regarding claim 4, the motivation for combining references is that flexographic printing allows selective application of the photoresist so only specific areas are coated as opposed to spin coating for example.

As to applicant's remark (page 6) regarding claim 6, a motivation for combining references was provided (in page 7 of the office action).

Conclusion


2. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mahmoud Dahimene whose telephone number is (571) 272-2410. The examiner can normally be reached on week days from 8:00 AM. to 5:00 PM..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on (571) 272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


MD

NADINE NORTON
SUPERVISORY PATENT EXAMINER
